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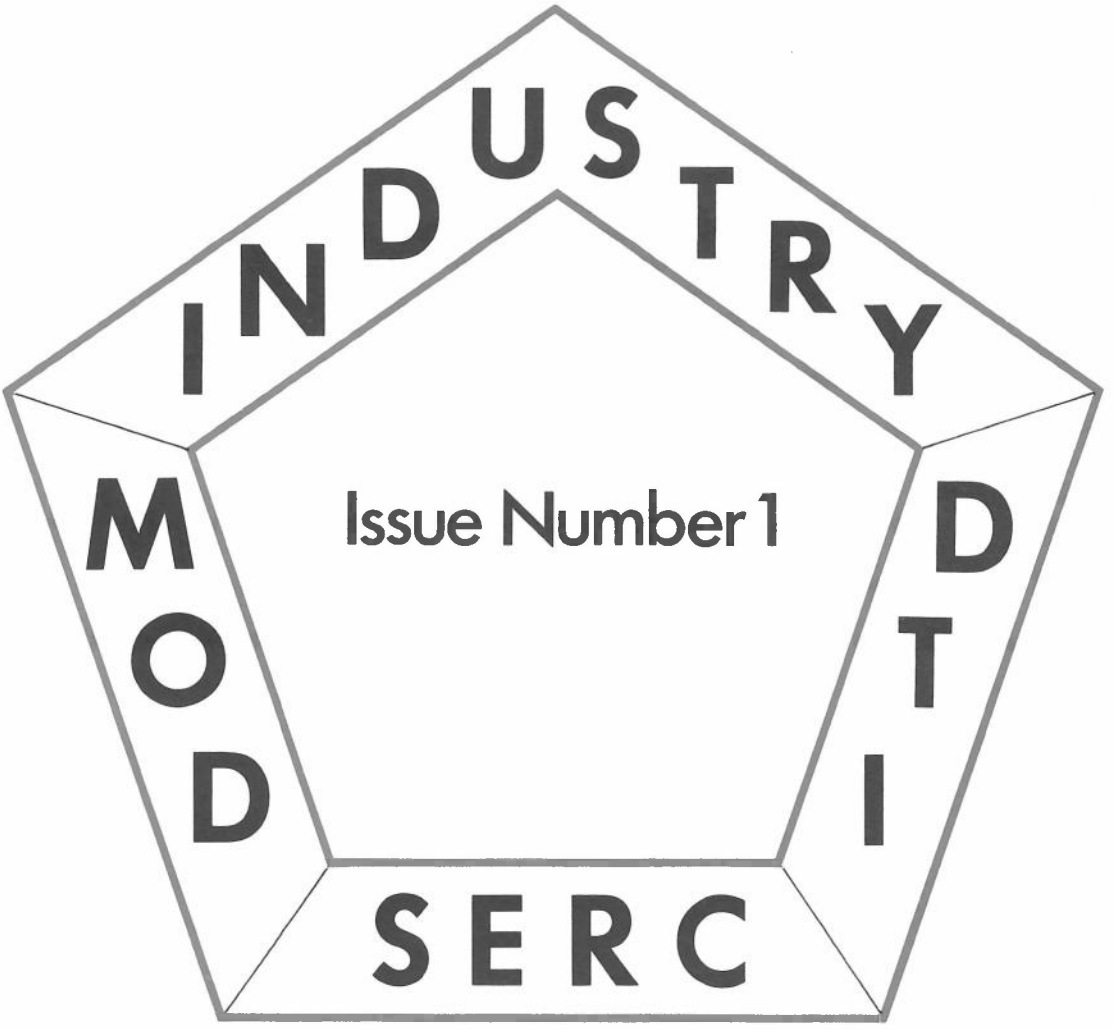
ALVEY NEWS



Issue Number 1

September 1983

Alvey News is published as the official newsletter of the Alvey Directorate by The Institution of Electrical Engineers in association with the British Computer Society.
Editor: J P Tomlinson, IEE, Savoy Place, London WC2R 0BL

Contents

Please remember to fill in the Alvey News questionnaire enclosed as a separate insert in this issue.

ON-LINE ACCESS

This Newsletter will often give references to material stored in On-line Access: Various databases that will be established as the Alvey Programme develops. Where these may be reached by authorised Alvey participants details will be given in this newsletter.

As an example, this contents page is available in: BT GOLD - < ID ALV003>. Password <NEWS>.

The Alvey Directorate is not responsible for the opinions expressed in articles contributed to Alvey News by external parties.

ABOUT ALVEY NEWS

This first issue of Alvey news is an important step for the Directorate. It is intended for wide distribution in the UK and it reports in general terms on progress over the first few months of the Alvey Programme.

The format and contents of future issues will be very much up to you – the reader. The intention is to provide information on the Programme's activities and progress and to include news on the relevant technology. However, the questionnaire enclosed in this issue is your chance to tell us what you want, and what you think of it so far. Please mark it up as you read the articles and return it soon – otherwise you will not receive future issues.

The essence of the Alvey Programme is Advanced Information Technology and I want to see this theme appearing in our Infrastructure and Communications activities. We must take our own medicine – where it will not actually hamper our operations.

HOW TO CONTACT US

There will be various electronic services established as Alvey develops and details will be given in the Newsletter, and also via electronic media. You are invited to try:-

Prestel Page	20472
BT Gold	Alvey Mail box ALV 003
SERC mail	RLIX ALV (not known yet)

Where articles are available on-line, the access details are given at the end of the printed text, as shown below

BT Gold <ID ALV 003>
Password <NEWS>

Derek Barber

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The Alvey Programme:

An Introduction

The report of the Alvey Committee entitled 'A Programme for Advanced Information Technology' was published in 1982. In order to implement the recommendations of this Report, the Government has now set up the Alvey Directorate under the leadership of Brian Oakley. The Alvey Programme is a collaborative research programme for the UK. It will be run as a matrix of technologies and major projects taking advantage of technological developments. A plan of action will be drawn up for each of the four main technologies making up the Programme, Very Large Scale Integration, Software Engineering, Intelligent Knowledge Based Systems and Man-Machine Interface. These plans will be drawn up by working parties consisting of experts and the academic community. Although not specifically identified as such in the original Report, the Infrastructure and Communications aspects are now regarded as sufficiently important to merit the status of a fifth area of activity, including research.

Research projects will be carried out by consortia normally involving at least two industrial parties and it is hoped that academic and government research establishments will be included in many of the collaborative projects. Representatives of all partners engaged in contracts within a single Alvey category will form an 'Alvey Club' which will meet regularly to review progress and provide constructive feedback.

A key concern of the Alvey Programme is that all sponsored research should be exploited as effectively as possible. Proposals for research will be judged on the following criteria.

1. The relevance to the objectives of the Programme.
2. The benefit of co-operation demonstrated by the proposal.
3. The quality of the participating teams.
4. Background knowledge and experience brought to the task.
5. The ability of the participants to exploit the work.

It is estimated that the proposed research will require funding of £350m over five years, £50m in academic institutions and £300m in industry.

FROM THE ALVEY DIRECTOR'S CHAIR

There has been a very encouraging response to the Alvey Directorate's first progress report. We should like to thank the many organisations who responded and will circulate regular Newsletters to all who have replied or who wish to become associated with the programme.

The first line team of Alvey Directors is now in post, and we are very grateful to those firms who are seconding staff at their own expense. We are still looking for a few support staff to help the Directors. Our main problem lies in the IKBS field where we urgently need someone from industry to support Dr Thomas.

The first Strategy document has now been issued (see p.7) and we intend that others will follow over the next few months. These will indicate the scope of the Alvey programme and what the Directorate sees as the priority topics in each field. Comments and advice on these strategies will be welcome.

Now that the Directors are in post, we welcome applications from consortia wishing to take part in the programme and proposals should be discussed with the appropriate Director at an early stage in their preparation.

An application form and advice on the preparation of proposal documents will be issued shortly, but in the interim any applications shall include, besides a description of the proposed research and its objectives, an estimate of the costs and timescales, details of the consortium and the benefits from the collaboration and a statement of how the project fits into the Alvey programme.

Brian Oakley

NEWS FROM THE DIRECTORS

S. L. H. Clarke

Deputy Director of the Alvey Programme and Director (Large Demonstrator Projects)

Laurence Clarke was educated at Westminster School and Trinity College Cambridge where he took a mathematics degree. He joined the research laboratories of Elliott Brothers (London) Ltd in 1951 as a junior engineer and was involved in the development of many of the earliest British computers.

In 1970 he became Technical Director of GEC Elliott Automation and comes to the Alvey Directorate from the post of Assistant Technical Director (Computing and Automation) for GEC plc.

Mr Clarke has been, as chairman of the SERC Information Engineering Committee and a member of the Engineering Board, in the forefront of the SERC contribution to the present IT initiative.

He is vice chairman of the Control and Computer Board of the IEE, and a visiting professor in the Computer Science department of University College London.

Large Scale Demonstrators

We have received proposals for eight projects to date and have been notified of the topics of a further nine. A further three companies have indicated that they will be making proposals. This is a very encouraging response and means that we should be able to collect a very exciting set of projects.

The Board has approved the project definition phase of four projects and we anticipate starting a further six or seven such studies. After two or three months the final selection will be made and four or five demonstrators will be set in motion.

Apart from the project definition these studies will specify market-led goals to the enabling technology research programmes. This will introduce a firm direction towards the exploitation of the results of the Alvey Programme.

It is not possible at this stage, for commercial reasons, to release details of the projects so far approved to the project definition stage but the applications already cover manufacturing industry, public service and natural resources. By the time the next newsletter goes to press we hope to be able to give some details of a number of the projects in hand.

T. E. H. Walker Director (Administration)

Timothy Walker is an Assistant Secretary in the Department of Trade and Industry. He obtained his D.Phil in Theoretical Chemistry from Oxford University in 1969. He then spent two more years at Oxford and in 1971 he went to the USA with a Harkness Fellowship and was a Visiting Professor in the Department of Physics at the University of Virginia and subsequently at Northwestern University, and a Consultant to the Argonne National Laboratory. He spent two years in local government from 1974-76 and joined the Department of Trade and Industry in 1977. Since then he has worked on exports to the Middle East, telecommunications and in the Industrial Development Unit. He spent 1982-83 at the London Business School where he was awarded a Sloan Fellowship.

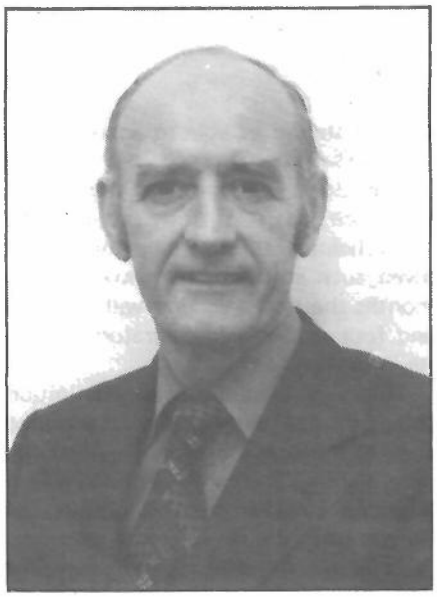
Administration: A Note on Industrial property rights

A joint working party has now been set up with industry to advise the Alvey Directorate on these and related issues. The industrial members have been nominated by the Electrical Engineering Association (EEA) and the Computing Services Association (CSA) and companies who wish to brief those representatives or to raise particular points are encouraged to contact them either directly or through the appropriate committees of the two associations. The members are, from the CAS: Ranald Robertson (CAP, Linda Webber (Logica) and Geoff Parr (BL Systems); and from the EEA: John MacNaughton (Plessey), David Rouse (GEC) and Graham Hoddinott (Lucas Aerospace). Dr Walker is chairing the working party and David Morgan, who has joined the Alvey Directorate on secondment from MoD, is the secretary.

There is an urgent need to settle the contract terms and the working party intends to report by Christmas. The outcome will be rules which will govern the grant of money to industry from the Alvey programme and set out the regime for Industrial Property Rights. Members of consortia will then negotiate the details of their relationship, including licence fees, rights to exploit and so on, between themselves taking account of their own commercial interests but within the framework set by the Alvey rules. This is a similar approach to that used for ESPRIT and the Alvey rules will take into account the need for compatibility between the two sets of contractual arrangements.

Even with this timescale, some Alvey contracts will be let before the contractual conditions have been finalised. It is important that these contracts should make appropriate provision for Industrial Property Rights and it has been proposed that they should contai· a clause applying the rules which will be agreed in the working party. The clause would provide an outline of the intended scope of these rules and provide suitable safeguards for circumstances in which agreement was not reached.

D.L.A. Barber Director (Infrastructure and Communications)



Derek Barber's career began in the Post Office (now British Telecom) Research Department. On graduation from London in 1954, he joined the National Physical Laboratory, working on early analogue and digital computers and their applications in metrology and process control.

As Head of Information Systems Branch, he managed the NPL packet switching and database research activities and, in 1973, became Director for the European Informatics Network. This ten-nation collaborative research project laid the foundation of much of the present European work on packet networks and protocols. He is co-author of two books on computer networks and their protocols.

In 1980 he joined the DoI MAP project, leaving to go to Logica Ltd as Principal Consultant in 1981. On transfer to Logica Holdings in 1982, he became responsible for technical co-ordination in the Logica Group of companies.

He is a Fellow of the Institution of Electrical Engineers and a member of the IEE Computing and Control Divisional Board.

Infrastructure and Communications

The early establishment of an infrastructure to support the Alvey programme is of vital importance. This infrastructure will comprise five main elements:

1 The Directorate local area network
2 The Alvey Network services
3 Information dissemination and publicity
4 Other services for Alvey participants
5 Infrastructure Research Projects

Advisory groups are being set up for 1, 2 and 3. Advisory groups for 4 and 5 are under discussion.

1. The Directorate Local Area Network

The prime support for the Directorate is a commercial local area network This will be linked via the Public Packet Switched Service to the external Alvey Network, described below. The LAN system provides electronic messaging, diary management, word processing and a hierarchical filing system with conventional methods for the control of access. Personal computing is also available and there will be databases for project management, financial control and so on.

To facilitate the mobility of Directorate staff, dial-up access to the Local Network will be provided. A mailbox on BT Gold already offers a poste restante service for electronic messages sent to the Directorate and mailboxes for the Directorate have been allocated on the SERC mail-server at the Rutherford Appleton Laboratory (RAL).

2. The Alvey Network Services

All Alvey participants must be able to communicate effectively with each other. The basic connections to allow this will be via the public telephone or packet switched networks, and the basic medium for intercommunication will be an electronic messaging service. Initially this will use the existing SERC mail-server at RAL but soon a new similar system will be located at NPL. The two systems will be linked via PSS and will interwork using the JNT (Joint Network Team) grey book protocol. This will be superseded by the CCITT inter-mail-server protocol as soon as this becomes reasonably widely accepted.

To simplify the use of Alvey Mail, user-friendly software packages will be considered for widely available personal computers, eg, BBC micro. It is possible that similar software may also be implemented on existing local networks that provide access to the Alvey mail services.

An on-line directory and associated database of Alvey participants will be created to facilitate the use of the mail service and also of the other Alvey support facilities that will appear later, see 4. below.

Plans are under discussion to augment the mail service by providing file transfer document delivery and teleconferencing facilities. Access from public and private Prestel terminals and the Teletex service will also be considered.

To complete the basic network services a jointly-funded Gateway will be established to link the Alvey and ESPRIT mail services.

3. Information Dissemination and Publicity

These activities are fundamental to the co-ordination and success of the Alvey programme. This first issue of Alvey News is the product of the joint team, formed by the IEE and the BCS to provide a major part of our requirements in this area. Later, a selective information dissemination service will be available for Alvey user clubs. The INSPEC abstract service will be extended to cover Alvey topics in depth and there will be some reporting of overseas developments. This last activity will be augmented with surveys and analyses by specialist companies and, of course, by Alvey participants' reports of overseas visits.

Much of the above information will be captured in computer databases. Eventually these will be accessible via the Alvey communications facilities following the development of suitable interfaces and gateways.

4. Other Services for Alvey Participants

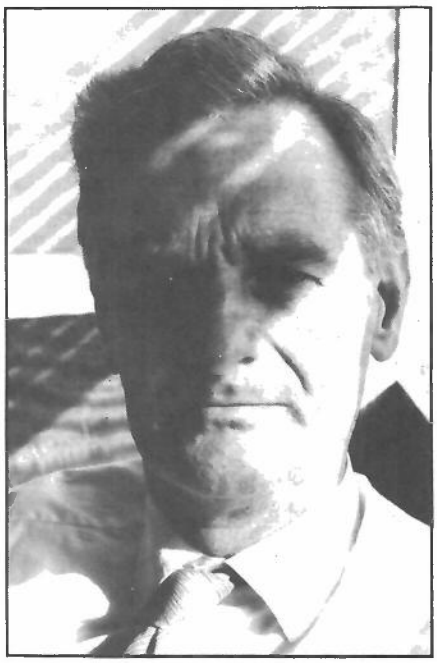
An Advisory Group will be formed to consider likely future needs of Alvey participants and to recommend appropriate actions to the Directorate. The membership of this Group will include both providers of services and likely user groups.

It is, of course, difficult to predict what will be required as the Programme develops but as an example there will be various project management and control mechanisms established, with associated databases which may need to be linked in some way. The integration of voice and data services emerging in office automation and elsewhere may also prove important in the lifetime of the Alvey Programme.

5. Infrastructure Research Projects

The Alvey report did not specifically identify Infrastructure and Communications as a research area. However, as the Alvey Programme progresses the support facilities may well have to be upgraded especially if new technologies emerge for providing them. There will therefore be a limited research programme in this area and proposals for suitable projects will be most welcome.

Dr. D. B. Thomas Director (Intelligent Knowledge Based Systems and SERC Liaison)



David Thomas graduated in physics from Manchester University in 1952 and obtained his PhD from Cambridge University in 1956. He then spent three years working in industry on analogue computers and missile control systems. In 1959 he moved to Imperial College London to design the control system of a Hydrogen Bubble Chamber and then transferred to CERN Geneva for a three year period with this project before returning with it to Rutherford Laboratory in 1963. Since then he has led various high technology projects there in fields as diverse as superconducting magnets, fluidized bed combustors and micro-electronics. He was appointed Division Head of Technology in 1976. Since 1981 he has also been Associate Director Engineering of Rutherford Appleton Laboratory and during this time played a prominent part in the work leading up to the formation of the Alvey Committee. He is a Fellow of the Institution of Electrical Engineers.

Intelligent knowledge based systems Interim Strategy for IKBS

A report entitled 'Intelligent knowledge based systems – A programme for action in the UK' was published in August 1983. The 3 volume report was circulated widely in UK and it is intended to be used as an interim strategy statement for IKBS until such time as comments on the report are received and digested. The strategy will then be modified as appropriate to take these comments into account.

The report was prepared by a Study Group jointly sponsored by the then Department of Industry and by the Science and Engineering Research Council. The Group was set up in December 1982 under the Chairmanship of Dr John Taylor of the Admiralty Surface Weapons Establishment to formulate a future UK research and development programme into Intelligent Knowledge Based Systems (IKBS). The Study was carried out over a six month period by a team comprised of researchers from universities, industry and government laboratories. The workshops organised as part of the Study were attended by some 40 persons the preponderance of which were academics, this reflecting the distribution of activity in IKBS in the UK at the time the Study was initiated.

The report proposes a UK programme under three main headings; Research and Development, Awareness and Marketing, and Infrastructure. Preliminary budgetary estimates are given in Vol. 1 annexes of the report which indicate that a programme of the scale described would require some £30M over five years.

Research and Development Component

The Research and Development heading is sub-divided into 5 sub-headings:

'Show Me' Projects – demonstrations of existing IKBS technology

Short Term Development Projects – to produce marketable products in 3 to 4 years

Demonstrator Projects – complete prototype systems embodying new research results

Research Themes – long term directed research on selected topics of importance to future IKBS technology

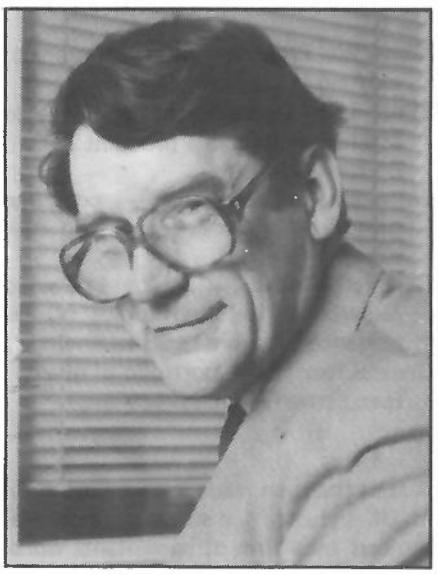
General Research – portfolio of quality, speculative research proposals.

A start has been made in searching within UK industry for suitable 'Show Me' projects by a firm of consultants working under contract to the Alvey Directorate. If suitable projects are found these may be used as case studies in the Awareness Programme.

Some of the Large Demonstrator Projects already submitted to the Alvey Directorate in response to written invitations are principally concerned with IKBS. These are currently being evaluated as candidates to fill the role of IKBS Demonstrators.

A Workshop on one of the proposed Research Themes – Intelligent Front End Processors – took place last month and a second on Natural Language is being planned for December.

C.W.M. Barrow Director (Man-machine Interface)



Chris Barrow started his career as a student apprentice at Siemens Bros in 1950. Studied part-time for an engineering degree in Electronic engineering at Northampton Polytechnic (now City University). Worked on Research into Electronic Telephone exchanges. In 1963 took over the development of a 24 Channel pcm system for the (then) British Post Office. Worked on the original instantaneous compander using the A-Law. Moved to Pye TMC in 1968 on early VLSI design for Private Automatic branch exchanges, and transferred to Philips in 1970 to join a team developing the stored programme controlled PRX system. Lived and worked in Holland during 1970-1971 and again from 1977 to 1979. Returned to England to join Plessey Office System Limited as head of Advanced Development. Joined the Esprit panel for Office Automation in 1980, and was seconded to Alvey Directorate in August 1983.

Man-Machine Interface

One of the first and perhaps the most crucial task facing the Director MMI is to generate a strategy which will express the aims of the Alvey initiative in the field of MMI. This document will have to include the steps to be taken in order to achieve these strategic aims. MMI is a broad diffuse area so that one of the main sections must describe in some detail the areas which Alvey will support. It must also include a profile of support expenditure that reflects the correct emphasis to be placed on each of the research activities. It must also contain the management methods to be employed, with particular reference to the encouragement of collaboration which is key. Resourcing of the research programmes with men and women of the right calibre is another important topic which will be included.

For such a strategy to be successful it must be strongly supported by the MMI community, who indeed must contribute significantly to its formulation. It is therefore proposed to set up an organisation within the community to help the Director MMI generate the strategy. The original Alvey Report identifies a number of major areas under the generic title MMI. These include the more traditional hardware and software ergonomics together with the more specialized areas of speech recognition, image processing and flat screen display technology. It would be virtually impossible to cover this wide range with one advisory board. It is therefore proposed to set up two working parties in the specialist areas of Pattern Analysis (to include speech synthesis, speech recognition and image processing) and Display Technologies. The chairman of each will be a member of the advisory board so that conclusions from the working parties may be correctly integrated by the advisory board into the final strategy document.

The majority of the invitations for the advisory board have been sent and accepted. Of the two working parties the membership of the Pattern Analysis is nearest completion. Professor Brian Shackel of Loughborough University has kindly accepted the chairmanship of the Advisory Board and Professor Ullman of Sheffield University has kindly accepted the chairmanship of the working party on Pattern Analysis. The Chairman of the Display working party will be announced shortly.

The first meeting of the board has been set at 30 September and the final document targetted for the end of November. The initial meeting has been timed to occur after the SERC ad hoc committee report on MMI, which is seen as a valuable input, and may be used in the Alvey strategy discussions. The Directorate have also commissioned, as further input, two surveys of the UK industrial research and development in MMI. A survey of companies involved in defence is being conducted by Logica and the industries not involved in defence are being surveyed by EOSYS. It is urgently hoped that industry will help the Directorate by co-operating fully with this fact finding mission. Putting the results of this survey together with inputs of SERC and the Government Establishments, will enable an up to date overall picture of MMI effort in the UK to be obtained. The survey will also give companies the opportunity to express their views on which MMI topics they would like to see extra effort being expended in the national programme. Obviously the individual replies to the survey will be confidential to the Directorate, only the aggregate results will be published.

D. Talbot Director (Software engineering)

David Talbot joined ICL in 1960 and has held management posts in technical support, sales and marketing.

His most recent role was as ICL's worldwide business and strategy manager for mainframe systems in Product Marketing Division.

He was educated at Maidstone's Technical and Grammar Schools and at Oxford where he read mathematics.

Software engineering

Mr Talbot joins the Directorate from ICL. Dr Rob Witty, Head of Software Engineering at the Rutherford Appleton Laboratory (RAL), in addition to his responsibility for the technical co-ordination of SERC financed work in this area, will support Mr Talbot in his role.

A strategy paper giving an overview of the aims of the programme; the directions that it proposes to follow; and the management arrangements that it hopes to put in place, is in the course of preparation. It draws extensively on the recommendations arising from the widespread consultations that took

Talbot continued

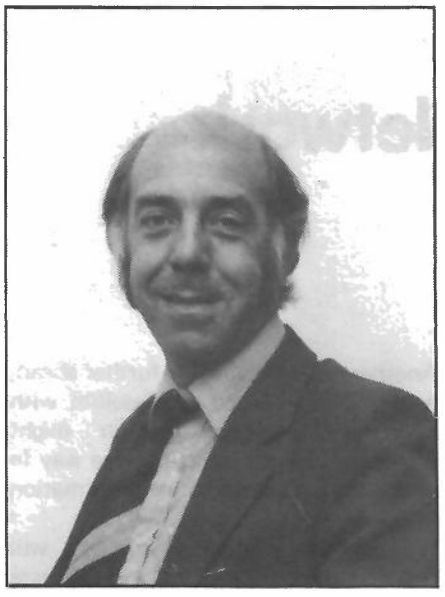
place prior to the production of the main Alvey report. It is planned that this Strategy Overview will be widely available in November and will pursue the three key objectives identified in identified in the main Alvey report of:

EXPLOITATION — programmes of action to ensure that the best available tools and techniques are effectively used, and that their benefits are gained by industry as a whole

INTEGRATION — work will be undertaken to establish a series of progressively more powerful and integrated Programming Support Environments

INNOVATION — programmes of research and development will be put in hand to extend the methodologies and techniques of software engineering. Of immediate interest is work covering formal methods of specification; methods of measuring and predicting levels of productivity and quality and the development of techniques that will allow the establishment of libraries of software components for wide re-use. In the management of the programme the Directorate will aim to use, as far as possible, existing government advisory mechanisms to assist in the shaping of the overall strategy; the achievement of better levels of co-ordination within the software area and the promotion of support for the strategy. This will be achieved by expanding the membership and scope of the Computers and Communications Subcommittee of the Electronics and Avionics Requirements Board.

Dr. W. Fawcett Director (VLSI and Ministry of Defence Liaison)



Dr W Fawcett graduated in Physics in 1960 from Durham University and obtained his PhD in theoretical physics. He then joined RSRE Malvern in the theoretical physics section where he carried out research mainly in the area of semiconductors. In 1975 he was appointed Superintendent of the Optical and Laser Techniques Research Division at RSRE transferring in 1978 to the Superintendency of the Signal Processing Division. In 1981 he was appointed Head of the Physics Group at RSRE. Dr Fawcett is also Professor (Associate) in the Department of Electronic and Electrical Engineering in the University of Sheffield.

VLSI and CAD

The strategy for the VLSI and CAD area is now well-advanced. Mr B D L Wilson, Plessey, Caswell, co-ordinated an industry view and it is hoped to establish guidelines on the associated University's Programme in the very near future.

Within each topic area, it is planned where necessary, to request lead co-ordinators from Industry, Government Establishments or Universities as appropriate to work with the Directorate and recommend optimum collaborative arrangements. Plans in some areas are already well-advanced. In the meantime preliminary discussions continue with many potential Alvey contributors and these are providing a vital input in formalising plans. All organisations are encouraged to let the Directorate know of their plans, even if they are at a formative stage, so that they can be considered against the overall strategy.

The existing research consortia could undoubtedly play an important role in the Alvey programme in providing views on the programme content, the evolving strategy, information sharing, organising seminars etc. With this in mind, discussions are taking place on how this might be best achieved.

A decision-making mechanism has been proposed for individual contract proposals. This involves a rapid consideration by Government and Industrial committees, the final decision being taken within a small Directorate co-ordinating committee involving DTI, MOD and SERC. It is planned to invite experts to join these advisory committees in the very near future. Separate Government committees for VLSI and CAD will be needed, these being based on the MOD DCVD organisation, which will also handle industrial contract placement. It is anticipated that University contracts will be placed through the SERC Secretariat. The existing DCVD General Circuit Devices research committee, with membership strengthened as appropriate, will form the basis of the Government VLSI committee.

The strategy, the decision-making mechanism, the contract arrangements and the role of the consortia should all be established within a few weeks. It should then be possible to move rapidly to contract placement.

Applications for support

Details of how to apply for support under the Alvey Programme will be given in Guidance Notes to be published soon. Those wishing to obtain copies should mark the enclosed questionnaire accordingly.

FOCUS ON:

Infrastructure and Communications

Alvey News is intended, primarily, to give an overview of what is happening in the Alvey Programme, with about the same emphasis given to each area of activity. However, there may be a demand for more in-depth treatment of selected subjects: perhaps by giving Directors an opportunity, in turn, to highlight their own area.

As an example, the paper prepared on the Alvey Network for the COST (Co-operation in Science & Technology) 11 bis Conference in Varese is reproduced below.

Initial thoughts on an Alvey Network

D L A Barber, Alvey Directorate

Introduction

The Alvey Programme [1] is a collaborative venture between Government, Industry and Academe to promote the use of information technology by stiumulating the development of new 'enabling' technologies in four key areas.

The success of the Programme will depend upon collaboration between many people. This means that a crucial factor will be the provision of effective communications facilities, so that participants may interact in the rich variety of ways that are bound to be necessary, as the programme unfolds.

The initial uncertainty about the number and location of the participants and the fact that these may change during the course of the Programme means that a private network would be unsuitable. The public networks, PSTN and PSS, will therefore be used to provide the basic connectivity between participants. However, there will be a need for interfacing facilities and gateways, to allow the interworking of dissimilar types of terminal equipment and computers.

The Alvey Programme must be seen in the context of all the other parallel investment which will be made in Information Technology and this requires the infrastructure plans to take account of the likely development of the public network and associated services. However, the Alvey action is intended to foster advanced research and development in the four key areas, with a view to commercial exploitation at an early stage. This is likely to demand an innovative approach to the design of new supporting network facilities, which should anticipate likely developments in public services, as far as this can be possible.

Inevitably, in order to provide an early basic service, it is necessary to use existing facilities. However, an attempt has been made to predict the probable shape of a network of the early Nineties, that would be able to provide a comprehensive range of services in a coherent manner. This scenario enables decisions about immediate actions to be taken with some feeling for the direction in which we wish to go.

It is vital for us to keep aware of external developments, even if they seem only peripheral to our main lines of activity, in case these offer valuable new opportunities. For example, personal computers will enhance the ability of the population at large to understand and use Information Technology. When these computers are associated with cheap modems people are able to communicate from their homes. This may well have significant implications for Alvey participants, well before the end of the Programme. Another example, looking further ahead, is the Direct Broadcast Satellite with full-channel teletext, which might appear in time to transform the way in which we can disseminate information to our users.

Both the above developments will occur in the consumer market, whereas the Alvey programme is primarily concerned with creating products for the professional market. But the two markets are closely interdependent at the component level, so cannot easily be separated when considering the full ramifications of the Alvey initiatives.

Protocols and Standards

The most difficult problem in any communications system is that of interworking between dissimilar equipment. The realisation of the need for interworking on a national and international scale has led, in recent years, to the agreement of various international standards in the CCITT and the ISO. Some of these standards are now well accepted and are transforming our ability to exchange information between one system and another. A prime example is the CCITT Recommendation X25.

The ISO work on a 7-layer model of high-level protocols to cover interactions in an Open System are, unfortunately, mostly still at an early draft

stage. It will be the policy in the Alvey programme to adopt such international standards wherever these are available and, indeed, to adopt the 'intercept' strategy of implementing standards still in a draft form, even though this may mean changes must be made when the final version appears.

However, where service is required immediately existing tools must be adopted. Fortunately, in the UK, invaluable work has been done by the academic community, based on the early experience with the EPSS. This led to the development of the JNT (Joint Network Team) rainbow book protocols [2]. These mirror several of the ISO layers and are in daily use in SERC net, a private network which serves the UK universities and is funded by the Science and Engineering Research Council. Where ISO or CCITT standards are not available, the Alvey infrastructure will use the appropriate rainbow book protocols. But, of course, these will be superseded as soon as a stable draft of an equivalent international standard appears. An important part of the Alvey network activities will be to promote the implementation of these standards, in order to gain early operating experience with them.

Immediate Requirements

Our first problem is to determine what the Alvey participants will actually require in the way of support facilities. At this stage in the Programme we cannot know what their needs will be, but we can be fairly sure that they will want to exchange messages electronically [3]. In providing this capability, we must also create a framework that can be extended to provide further services as these become technically feasible, and a need for them arises.

A fundamental difficulty, which will ever be with us, is the wide diversity of terminal equipment that subscribers already have, or may find attractive in the future market place. This poses the problem of how to make different terminals interwork effectively. By definition, an interaction between two dissimilar kinds of equipment can use only those facilities which the two have in common. This means that most terminals can be used with a message service — provided messages are text strings with very simple formatting commands. For more complex interactions, the incompatabilities between terminals may be overcome to some extent by the use of a common 'spooling' system. This can act as a store-and-forward switch and gateway that also carries out protocol conversion and mapping between different, but similar, features of connected terminals.

Another major problem, yet to be solved in networks generally, is that of addressing [4]. With an electronic message service, the problem may be alleviated by providing 'name-servers' which keep directories of all subscribers and their location. This has the advantage that such name-servers may be updated when participants move around. Gateway and name-server functions may be combined in a single machine, but it is generally better to use separate machines, linked by a network.

To meet the basic requirement for all Alvey participants to be able to exchange messages, an Alvey mail-server is being set up. Each participant will have a 'mailbox' on this server which will be modelled on the ones already operated through SERC net. In addition, the existing SERC mail-server at RAL (the Rutherford Appleton Laboratory) will be enhanced, and Alvey mailboxes will be provided for academic users who are already connected to SERC net.

The Alvey mail-server will be a GEC 4000 series computer, with similar software to that used for the existing SERC system. It will be located at NPL (the National Physical Laboratory) and will be linked via PSS to the RAL machine. The JNT 'grey book' protocol will be used for interactions between the two mail-servers. This will be an interim arrangement because, as soon as possible, the CCITT protocols for connecting mail-servers will be implemented in the Alvey and SERC mail-servers, and possibly also in some other existing mail systems.

A problem with many systems is the complexity of the user interface and mail-servers are no exception. Participants in Alvey will not all be sympathetic computer specialists, so our services must be very reliable and easy to use. The trend in networking is to move intelligence towards the periphery. Accordingly, software will be developed to provide user-friendly interfaces for accessing the mail-servers using a few of the more common types of personal computer.

This software will probably comprise a menu-driven front end offering a selection of services, and a parameterised back-end which can negotiate a path from the user's terminal through any intervening network connections, into the required service. It will also probably carry out the basic interactions with each service to minimise the level of knowledge required by general users, before they can make use of that service.

A third element in the initial action plans will be the creation of a central register of Alvey participants, with associated items of information that will be valuable in managing the various research programmes. Initially, this will be a simple name-server, but will be developed later to include facilities for project management, and so on. For example, it might hold a list of Public keys, for those participants wishing to use encryption to protect confidential information [5].

Additional Services

There are a number of other services that we may reasonably expect the participants in the Alvey programme to require as their work develops. Examples are as follows:-

1 Interworking with terminals on different public services eg. videotex and teletex.
2 Transfer of files between different computer systems.
3 Exchange of computer programs ie. telesoftware.
4 The distribution of documents both in machine-readable form and on paper.
5 Access to a teleconferencing facility.
6 Interworking with participants in other programmes eg. ESPRIT.

Interworking with terminals on different services will be arranged by providing interface equipment between each particular service and the Alvey mail-server. Proprietary equipment is already available for interfacing private videotex systems to main-frame computer services and this kind of equipment will be used in the Alvey network as a front-end to the mail server.

A similar approach will be adopted for teletex connections using proprietary software running on a machine of suitable capacity.

File transfer is already possible between sites that have implemented the rainbow book protocols. But there may also be a need for a central service. If so, facilities will be provided by enhancing the mail-server, if it has sufficient reserve capacity. Otherwise, a separate machine will be installed as a central file exchange medium. It is likely that this will be delayed until ISO OSI file transfer protocols are available. Should an early demand for a file-server arise, the JNT file transfer protocol may be adopted as an interim measure. In any case, this will have to be provided so that the file-server may act as a Gateway between users of the old and new file transfer protocols.

The provision of telesoftware facilities is likely to be at two levels. Once a file

transfer service is available, programs may be readily and effectively transferred in the form of program text files. However, some software, for example the user-friendly packages for intelligent terminals, might well be stored in the mail-servers, so as to be available for down-loading of the terminals, on demand. There is already a growing use of Prestel for transferring software for educational use, and the techniques are beginning to be used in other areas as well, eg. the Micronet 800 service. Should any of the Alvey participants wish to use this approach, the planned Gateway between the mail-server and the public Prestel service should make this possible, fairly soon.

The essential requirement for a teleconference service is that several users can have access to a common set of 'conference' files and must be able to append their contributions and comments to these files, as and when they wish. The best known European system of this kind is COM [6] developed in Sweden. A portable version of this system, PORTACOM, was commissioned in 1979, by the COST 11 management committee, and it is possible that PORTACOM will be enhanced for use in the Alvey programme. Meanwhile, the feasibility of using a COM system already running in the UK will be explored, for those Alvey participants who particularly want such a service at an early date.

The exchange of documents between Alvey participants will not be simple, even when they are in machine-readable form. This is due to the wide variety of ways in which documents are specified in different computer systems. The work on standard document formats in ISO and CCITT is at an early stage, so the use of teletex protocols will be a more promising initial solution to this problem. It may be possible to enhance the planned Teletex Gateway to provide a store-and-forward teletex-based document exchange facility, if this should be required. For documents in paper form it will be necessary to use a facsimile service, probably combined with the teletex service, as is envisaged for Project Hermes [7]. The DOCDEL action [8] may also be relevant.

The interaction between participants in different programmes eg. Alvey and ESPRIT, clearly depend on the use either of common protocols or the provision of a Gateway to map between the infrastructure facilities provided for the two programmes. Discussions are in progress on a Gateway between Alvey and ESPRIT to allow the exchange of electronic messages. This is likely to be a GEC Series 63 machine, running the Unix UUCP mail system (initially adopted for the ESPRIT network), and the grey book protocols necessary to link the Gateway with the Alvey mail-servers. The Gateway may also serve UK users of UUCP mail, if they so desire.

The policy on standards of the EEC Commission Directorate responsible for the ESPRIT project is the same as that of the Alvey Directorate; namely, that ISO and CCITT protocols will be adopted as soon as this is technically feasible. When this occurs, it may be possible to dispense with the Alvey-ESPRIT Gateway, which might then be adapted for some other form of interworking service, should this be required.

Research and Development

Some of the participants in the Alvey programme will require very advanced communications facilities to enable them to carry out their research activities. There will certainly be a need for wide-band links between some sites, as has been demonstrated by the very successful project Universe. This has involved the linking by satellite channels of local area networks located at seven sites; some academic, some industrial. There are proposals to enhance the Universe project by the addition of terrestrial megastream links. This augmented project will provide valuable information for the creation of an Alvey service of a similar kind, where this is needed.

There will be other areas where research and development on network techniques will be necessary if the Alvey infrastructure facilities are to keep pace with the requirements of the users. In many cases, this may be part of one of the demonstrator projects, but occasionally there may be a need for a specific piece of R&D work to enhance the Alvey infrastructure in some way. Proposals for this kind of thing will be considered on their merits as the occasions arise.

The Future

At this early stage, there is little that can be said about the longer term future of the Alvey network services. For, to a large extent, the way they develop will depend upon the users requirements. These, in turn, will depend on how the Alvey programme unfolds.

It will be particularly interesting to see what kinds of service are required for the demonstrator projects, for these are likely to involve more than one of the Alvey key areas. It is quite possible that the participants in a demonstrator project will wish to form a closed user group with privileged access to particular services designed for their own special requirements. There will also be various other Alvey 'user clubs' that may ask for special facilities. But, again, it will be a while before we will discover what these may be.

One certain requirement will be measures to safeguard the security of commercially confidential information, either in transit through the network, or stored in a database. It seems essential that sensitive information will have to be encrypted by the user so it will be necessary to study soon how best this may be accomplished.

Conclusions

The Alvey programme is an exciting one, offering unique opportunities to move forward rapidly in some key areas of Information Technology.

The infrastructure and communications facilities are fundamental tools to support the Programme, and the accent must be on the proper fulfilment of this role. A useful start has been made, but much remains to be done.

At a later stage, it is expected that some worthwhile research activities will be associated with the further development of the infrastructure services. The areas of interworking between different services, reliability and security, and the use of high speed packet switching, seem the most likely ones at this stage of our thinking.

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World wide developments in Advanced Information Technology

A report by EIU Informatics

Note: This report has been submitted to the Alvey Directorate by the Economist Intelligence Unit and does not necessarily express the Directorate's view. If this type of material is of interest it can be published regularly with Alvey News. Please make your comments on the enclosed questionnaire.

The commercial temptation to go for short term reward is often at odds with the strategic planning and concentration of effort needed to establish a leading position in a specific sector; the emphasis is on catching up rather than striking out in front. This is as true of the IT industry as it is of many others. In particular, long lead time R & D is neglected in favour of the short-term option: Esprit and Alvey seek to redress the balance for Europe and the UK gradually, but with long lasting effect. They are not alone.

The Japanese Government is investing US $500 million on the Fifth Generation Computer Programme. In the USA, President Reagan's August 1981 Economic Legislation provides incentives which are expected to encourage an additional US $3 billion spend in corporate R & D over the next five years.

Amidst this competition, Europe, especially the UK, can be confident of its ability to establish a leading position given the appropriate infrastructure and the right targets to focus on. The alternatives are wide in an IT market worth US $237 billion worldwide in 1980, perhaps three times as much by 1990. One important step in this direction is awareness of activity in each IT marketplace. Just as R & D should not be neglected in favour of marketing, so R & D cannot be conducted in a commercial vacuum.

It has been suggested that Alvey projects likely still to be in the research laboratory beyond the horizon of the present programme should have an eye kept on them by a kindly 'uncle' from industry. The present programme will also benefit from a 'little sister' from the commercial sector who will maintain awareness of IT marketplaces, worldwide, now and as they develop. Given the high stakes she'd better be alert, very active and like good little sisters always are, fairly wicked.

R&D developments in Fifth Generation Computer Research

Market Actors

W. Europe

ICL, Siemens, and Bull in France will be starting joint R&D in July this year. The institute is reported to have a £6m a year budget with some 60 staff working on:

- artificial intelligence
- computer aided design
- voice
- network software

The venture is looking for backing from ESPRIT and the UK, German and French governments[3].

Britain has initiated the Very High Performance Integrated Circuit programme to form a basis for developments in faster control flow computers.

GEC is backing technology for developing parallel processors. It is developing VLSI chips to implement advanced pipeline and hierarchical architectures in its Hirst research labs. It is working on two chips – one a pipeline architecture chip called a systolic array designed for signal processing, the other a multiprocessor hierarchical chip called GRID (GEC rectangular image and data processor). The Hirst lab has made a systolic array chip which operates as fast as many so called very high performance integrated circuits, being developed by the US Department of Defense[9].

University College London has built the Clip4 computer based on the GRID concept[9]. ICL has developed the Dap (Distributed Array Processor), which is based on hierarchical multiprocessor architecture in second and third generation technology[9]. Both are single instruction multiple data machines.

Manchester University is exploring data flow computer technology. It has built a 5 processor machine and is working on a design with 15-20 processors[2]. The computer is a multiple instruction multiple data machine. It will prove a useful test bed for fifth generation computer languages.

Inmos has developed OCCAM as an operating language for parallel processing, and the Transputer is the chip

designed to exploit the language efficiently.

Newcastle University is using the Bell Laboratories' Unix operating system to run von Neumann control flow machines in parallel mode. It is implementing Unix's contextual addressing and nested cell structure in hardware. Two chips are being developed, one is a 16-bit reduced instruction set microcomputer with instructions to support parallel processing; the other implements a synthesis of concepts found in conventional control and data flow and reduction architectures.

Imperial College, London is developing the Hope language to be run on its Alice computer, which is to be built with a network of Transputers.

Burroughs Corp (UK) has demonstrated working systems a complete wafer scale technology and architectures to go with it.

The University of East Anglia is devising a machine consisting of a regular array of microprocessor-like elements. These computers are comparable to systolic arrays.

In France the Centre d'Etudes et de Recherche de Toulouse have been studying and designing a SIMD single assignment data flow computer over the last decade. The Centre first designed a high level parallel language, and a compiler. A hardware prototype of the Single assignment language has been built[7]. Research into single assignment parallel architectures is continuing and the centre is collaborating with computer manufacturers.

In West Germany the government's Ministry of Research and Technology is sponsoring research in parallel processors to the tune of $4m.

The University of Frankfurt has a data flow computer project under way, which entails a multicomputer system with single board microcomputers operating according to the dataflow principle. A custom designed associative processor handles the data-flow control.

The Technical University in Berlin runs a laboratory for innovative computer systems. Two data-type parallel architectures are involved. One is a general purpose multiprocessor computer called Starlet and the other is a special purpose microprocessor array computer (MAC) for signal and image processing. Both apply the principles of object addressing and data typing; both are structured to distribute functions over a hierarchy of processors. The university has developed and implemented a Pascal extension for parallel processing. It is considering ADA as the primary language in the long run. The Starlet prototype achieves twice the performance of a DEC VAX/11 780 at half the cost. In array processing the machine reaches speeds of 3 Megaflops.

N America

In January 1983 a joint venture of 12 major US computer companies was formed under the banner of Microelectronics & Computer Technology Corp. (MCC). The company will concentrate on four areas of research:

- advanced computer architecture, or the design of new hardware, including a fifth generation computer;
- software technology;
- computer aided design and manufacturing for electronics;
- component packaging and interconnection.

The 12 companies sponsoring the venture are:

- Advanced Micro Devices Inc.
- Control Data Corp.
- Digital Equipment Corp.
- Harris Corp.
- Honeywell Inc.
- Mostek
- Motorola Corp.
- National Semiconductor Corp.
- NCR
- RCA Corp.
- Sperry Corp.
- United Technologies.

The objectives for the CAD/CAM programme are similar to those of the Japanese Fifth generation computer effort: to advance the state of the art by reducing design costs, and to improve quality by allowing the layout of mixed technology chips incorporating from 1 million to 10 million devices.

The computer architecture initiative has as a goal the development and transfer of selective technologies for future generations of computers and smart peripherals including:

- an artifical intelligence effort to establish the theoretical groundwork for AI architectures and to deliver a prototype system capable of 100,000 inferences per second;
- a prototype database machine architecture with a tenfold performance improvement over present processing architectures;
- a new user interface incorporating a prototype speech and image recognition system;
- one or more parallel processing architectures.

The initial phase in these two areas will be followed by a second in which prototypes will be implemented as large scale integrated circuits. In a third phase the LSI chips will be incorporated into the basis of a complete computer system.

The software technology phase will emphasise the use of intelligent systems to develop a new structure between the user and the programmer.

The packaging project has as an objective the development of packaging and interconnect technology that is compatible with automatic assembly at the integrated circuit and system level, is flexible to applications, supports a high pin count and is inherently reliable. The project has five phases:

- die preparation techniques for automated mass bonding that are feasible for pin counts of over 400;
- equipment automation to handle device lead bonding, burn in, and attachment to a substrate;
- device encapsulation to facilitate direct, reliable attachment to a printed circuit board;
- high density substrates with impedance control allowing power dissipation of 10 watts per square inch;
- reliable manufacturing and testability for volume production.

Initial returns of the programme will take 6 to 10 years; hence sponsors are required to make a commitment of at least 3 years. Apart from the 12 companies already underwriting the research a further 6 to 8 are considering signing up[1].

Participating companies will benefit according to CDC's chief William Norris from:

- a significantly expanded scope of R&D that will include projects individual companies could not undertake on their own because of the costs and risks involved;
- a reduction in wasteful and needless duplication of R&D;
- a better definition of R&D needs and pitfalls;
- a more effective utilisation of scarce professional resources[1].

The MCC venture may well run foul of the US antitrust laws. It is being suggested that the member companies could operate as a price fixing cartel which is against US law.[2]

The US Department of Defense plans to begin a billion dollar programme to maintain US leadership in supercomputers. The Defense Advanced Research Projects Agency (DARPA) is to ask Congress for approval for its 1984 budget of $50m growing to $405m by 1986, which will fund various areas including machines with operating speeds in the Gigaflop range. The DARPA programme, which would form the centrepiece of the US approach would be based at four universities and would concentrate on developments in:

- speech;
- semiconductor techniques;
- natural language;
- relational databases;
- graphics[5].

The Department of Defense plan is to develop further fast control flow computers, but is not really focusing on research into fifth generation computers.

Cray Research with its CRAY-1 was the first supercomputer. This is being followed by the X-MP system this

autumn and a Cray-2 by spring 1984 and a Cray-3 is in the pipeline.[10]

Control Data is hard on Cray's heels with its Cyber 200 series machines.

Denelcor Inc. is successfully developing parallel processing architectures via its HEP (Heterogeneous Element Processor) and its machines are said to be 2 to 8 times faster than the Cray-1[8]. Columbia University in New York is developing a multiprocessing computer called Non Von which has solved the problem of contention on data access[9].

The Massachusetts Institute of Technology is pushing the frontiers in the development of data flow computers [2].

Japan

MITI's development plans for fifth generation computers started in fiscal 1983. The budget for 1982-1984 is Yen 10bln, but in later periods the government is looking for more private funding and perhaps even foreign resources to try and reduce its financial commitments[4]. The Institute for New Generation Computer Technology, created to spearhead Japanese efforts in this field, is backed by:

- the Electrotechnical Laboratory
- NTT
- Fujitsu
- NEC
- Hitachi
- Mitsubishi
- Toshiba
- Oki
- Matsushita
- Sharp[6]

Hitachi, Fujitsu and NEC are all developing super computers.

NTT is the only Japanese company truly trying to develop parallel processing architectures. Two types of data-flow are under study; one is a highly parallel processor array for scientific calculations, the other is an architecture designed to apply data-flow techniques to parallel list processing using an in-house functional language called VALID[7].

Tokyo University has had a data-flow project named Topstar under way since 1978, which tries to use a multiprocessor system using conventional LSI microprocessors[7].

Rest of the World

No developments are evident elsewhere in the world on fifth generation computers as reported in the press.

Applications

There is a need for a speed increase of three orders of magnitude to solve outstanding problems in nuclear physics, aerodynamics, ballistics, meterology, image and voice processing, knowledge processing, artifical intelligence, etc.

The Clip 4 concept is turning up in industrial vision systems, and the Hirst Centre wants to harness it in medical and other applications[7].

Technology

Parallel processing or concurrency is being developed along two different tacks:

- In pipelining the processing is shared among several processors. Chips for pipelining are based on systolic arrays, which in general are custom chips, optimised for specific applications. In systolic arrays all the processing functions operate in lock step simultaneously on different items of data.
- Multiprocessing allows different processors simultaneously to do different operations on the same data. In this technique contention is a problem, and the programming is still extremely difficult[9]. Efforts at Newcastle University are centred on exploiting the features of the Unix operating system. Central to Unix is the concept of file store management realised as a hierarchy of variable sized files and directories. By selective naming it is possible to address the files contextually, and frees memory from the limitations of machine's 16- or 32-bit address space. It thus creates a kind of decentralised control flow system[7].

Evolution

The generations in computer architecture have been identified by "Electronics"[7] as follows:

- the first generation was based on discrete components using vacuum tube technology;
- the second was based on discrete components and transistors;
- the third is based on integrated circuits;
- the fourth is evolving from developments in very large scale integration.

All the above generations are based on the classic von Neumann architecture, in which a single processor is fed a single stream of instructions with the order of their execution controlled by a program counter. All of today's programming languages faithfully follow this sequential model. This stored-program, or control-flow computer has proved a powerful tool because of its very general nature.

For fifth generation research most effort is concentrated on developing novel architectures for parallel processing mostly in university laboratories. Designs for faster processing can be roughly divided into three groups:

- computers designed around an extremely fast single processor in a control flow architecture. Of great interest to this group are the developments in Josephson junctions, gallium arsenide and denser packing. This approach to faster processing is primarily what the research departments of the major computer companies are working on because clearly they need to retain compatibility with their existing systems.
- supercomputers which use a few very fast processors and then enhance the control flow architecture with pipelines, vectoring and some specialised processors. These same techniques are being applied in high-performance microsystems.
- parallel processing which takes a large number of fast or medium-speed processors and arranges them in a parallel architecture and perhaps puts several hundred of them on one wafer. Data flow, a parallel architecture, is a concept for control of execution of computer instructions. Instructions are executed as soon as the input data they require are available. A data flow machine automatically exploits the parallelism inherent in problems and all instructions for which data is available can be executed at the same time if enough processors are available.

In the race for functional fifth generation computers, the US and W. Europe lag far behind the Japanese, and ESPRIT will not help, implies an analysis prepared by the German Economics Institute in Cologne. The organisation predicts that Japanese industry will have the knowledge based computers ready for international markets by the mid 1990s. In Europe and N. America none of the fifth generation projects under way are as "all encompassing and capital intensive" as the Japanese one. It doubts that the European R&D activities are at a high enough level to catch up, and it deems the various countries' efforts too splintered to achieve the solidarity needed. What is called for the institute says, is a data processing and communications related research project that far transcends ESPRIT[2].

Markets

At £10m-£15m a system supercomputers have found a small market. Only about 50 systems have been sold so far.

Sources

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[6] Times 14 June 1983
[7] Electronics 16th June 1983
[8] The Economist 3rd April 1982
[9] The Economist 11th December 1982
[10] Computer Weekly 19th May 1983

Advanced Information Technology Calendar

4 October 1983
Kensington, London
UK

Man-machine Interaction
Contact: R. Phillips,
Secretary, BCS Microcomputer Specialist Group, 21 Rye Close, Saltdean, Brighton, Sussex BN2 8PP, England

5 October 1983
London, UK

Dialogues for Expert Systems
Study report
Contact: SPL-Insight, The Charter, Abingdon, Oxon, England
Telex: 83164

12 October 1983
IEE, Savoy Place,
London, UK

The business of VLSI:
Lecture by C.A. Foxell
Contact: Electronics Division, IEE, Savoy Place, London, WC2R 0BL
Tel: 01 240 1871

16-18 October 1983
San Francisco, CA,
USA

3rd Software Engineering Standards Application Workshop
Contact: L.L. Tripp, Boeing Computer Services, PO Box 24346, M/S 9C-24, Seattle, WA 98124, USA

17-19 October 1983
Clearwater Beach,
FL, USA

Symposium on Reliability in Distributed Software and Database Systems
Contact: Dr. M. Liu,
Dept. of Computer and Information Science, Ohio State University, 2036 Neil Avenue, Columbus, OH 43210, USA

18 October 1983
IEE, Savoy Place,
London, UK

I.T. Standards and the D.T.I.:
a lecture by J.M. Foote
Contact: The Secretary, IEE, Savoy Place, London WC2R 0BL England

31 October-
3 November 1983
Port Chester, NY
USA

International Conference on Computer Design. VLSI in Computers
Contact: G. Rabbatt,
IBM Corp, 70Y Hopewell Junction, NY 12533, USA

1-3 November 1983
San Jose, CA
USA

Symposium on Application and Assessment of Automated Tools for Software Development
Contact: Dr. Ez. Nahouraii, IBM Corp, J15/F14, 555 Bailey Avenue, San Jose, CA 95150, USA

7-8 November 1983
Chicago, IL
USA

IEEE Workshop on Languages for Automation
Contact: Prof Shi-Kuo Chang, Dept. of Electrical Engineering, Illinois Inst. of Technology, Chicago, IL 60616, USA

7-11 November 1983
Chicago, IL
USA

COMPSAC 83. 7th IEEE International Computer Software and Application Conference
Contact: COMPSAC 83,
PO Box 639, Silver Spring, MD 20901, USA

25 November 1983
London, UK

User Acceptability of Fifth Generation Systems
Contact: SPL-Insight

30 November -
1 December 1983
London UK

Impact of LSI and VLSI Techniques on Communication Systems 2nd International Conference
Contact: Conferences Dept., IEE, Savoy Place, London WC2R 0BL England

6-8 December 1983
Monterey, CA
USA

Software Maintenance Workshop
Contact: Dr. N. Schneidewind, Computer Science Dept., Naval Postgraduate School, Monterey, CA 93940, USA

9 December 1983
IEE, Savoy Place
London, UK

VLSI modules for image processing systems: Colloquium
Contact: The Secretary, IEE, Savoy Place, London WC2R 0BL England

30 December 1983 -
7 January 1984
Bombay and New
Delhi, India

International Conference on Systems, Man and Cybernetics
Contact: Prof. W.B. Rouse, Center for Man-Machine Systems, Georgia Inst. of Technology, Atlanta, GA 30332, USA

8-13 January 1984
UMIST, Manchester
UK

Semi-custom IC Design and VLSI: 2nd Vacation School
Contact: The Secretary, IEE, Savoy Place, London WC2R 0BL, England, quoting Ref LS(CG)

25-27 January 1984
Paris, France

4th Congress Reconnaissance des Formes Intelligence Artificielle
Contact: AFCET, INRIA

28 February -
1 March 1984
San Francisco, CA,
USA

COMPCON SPRING '84
Contact: H. Hayman,
PO Box 639, Silver Spring, MD 20901, USA

25-30 March 1984
Hyatt Orlando,
Orlando, FL, USA

7th International Conference on Software Engineering (ICSE)
Contact: Dr. T.A. Stracker, Data Systems Division, General Dynamics, PO Box 85808, San Diego, CA 92138, USA

9-13 April 1984
Berlin, West Germany

Tutorials on Software Engineering and Distributed Computing Systems
Contact: Berlin Tutorials '84,
PO Box 639, Silver Spring, MD 20901, USA

June 1984
Udine, Italy

5th Symposium on Theory and Practice of Robots and Manipulators
Contact: Prof. G. Biarchi International Centre for Mechanical Sciences, Palazzo del Torso, Piazza Garibaldi 18, 33100 Udine, Italy

5-7 June 1984
Ann Arbor, MI,
USA

11th International Symposium on Computer Architecture
Contact: Dr. K.B. Irani
ECE Dept., University of Michigan, Ann Arbor, MI 48109, USA

Questionnaire

This first issue of Alvey News comes to you with the compliments of the Alvey Directorate. We hope that you find it interesting and will complete this questionnaire and return it to the address below.

1. Please indicate your degree of interest in the following:

TOPIC	ACTIVE IN THE AREA	KEENLY INTERESTED	BACKGROUND INTEREST	COMMENTS
Demonstrator Projects				
Infrastructure & Communications				
Intelligent Knowledge Based Systems				
Man-Machine Interface				
Software Engineering				
Very Large Scale Integration				

2. Do you wish to see the following appear regularly in or with Alvey News?

	YES	NO	COMMENTS
'FOCUS ON' column			
EIU Commentary			
AIT Calendar			

3. If you wish to receive the 'Guidance Notes for Applicants' when it is available, please tick here ☐

4. Comments and suggestions. Please indicate any ideas you may have for making Alvey News more useful to you.

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